



Idle Free Systems, Inc.

User Guide + Troubleshooting Manual

#62001

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Description	Page #
Overview	1
System Operation	3 - 17
Air Conditioning	3
Bunk Heat	3
Engine Heat	4
Truck Engine Running	4
Shore Power	4
Inverter Stand-by	5
ReeferLink	6
Thermostat	7
Heat Mode	7
Voltmeter	8
Evaporator	8
Battery Separator	9
APU	10
Power Converter	11
Ignition Cut-out	12
5 minute Delay Circuit	13
Water heater	14
Inverter	16
Troubleshooting	18 - 24
Inverter/AC	19
Thermostat	20
Shore Power	21
Water Heater	22
Bunk Heat	23

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#62001

User Guide & Troubleshooting Manual


Overview

About this Manual

Idle Free Systems, Inc. is committed to providing professional service and support for your Idle Free system. This manual is one part of that support.

This manual provides an overview of the battery-based Idle Free system for a sleeper truck. It includes tips for both maximizing system performance and troubleshooting the system while on the road.

If used properly, this manual should provide you all the information you need to get the most out of your Idle Free system.

 This manual contains detailed information about both heating and A/C. Depending on your Idle Free system configuration, you may have heat, A/C, or both.

Tips for Using this Manual

- Idle Free strongly encourages you to read this manual before using your Idle Free system. Using or troubleshooting the system without consulting this manual may prevent your system from functioning properly or result in damage to your truck.
- This manual provides tips for using a battery-based Idle Free system.
- Idle Free strongly encourages you to follow all necessary safety precautions when operating or troubleshooting an Idle Free system.

Additional Information

For additional support with the operation of your Idle Free system, please contact Idle Free Technical Support at techsupport@idlefreesystems.com or 920-206-9333.

You may also visit www.idlefreesystems.com for general information or to use our online contact forms.

#62001

User Guide & Troubleshooting Manual

Overview

Idle Free Electric APU

The Idle Free Electric APU captures energy produced by the engine's alternator and stores it in an independent, absorbed glass mat (AGM), Battery Bank. When the engine is turned off, the Idle Free system converts the 12 volt DC energy, stored in the Battery Bank, to 120 volt AC electricity.

The stored battery power is used as 12VDC power for engine and bunk heat or converted to 120VAC power for air conditioning.

The Idle Free system includes **Shore Power**. The Idle Free system uses a standard shore power inlet to tap available external electrical source. Whenever the IFS system is plugged into Shore Power the Idle Free system will have unlimited run time & the Truck's batteries and the APU batteries will automatically be charged.

System Operation

This manual will describe the operation of the Idle Free system in the following Modes:

- Air Conditioning mode
- Bunk Heat mode
- Engine Heat mode
- Truck engine running mode
- Shore Power mode
- Inverter stand-by mode
- ReeferLink mode

Component Detail

A few of the components used in the Idle Free system will be called out and explained in detail.

These components explanations will serve to assist in an improved understanding of system operation.

The Idle Free components explained in detail include:

- | | |
|---------------------|----------------------------|
| • Thermostat | • Shore Power |
| • Voltmeter | • Ignition cut-out circuit |
| • Evaporator | • 5 minute delay circuit |
| • Battery Separator | • Water heater |
| • APU (exterior) | • Inverter |

#62001

System operation

Air Conditioning Mode

1. Move Thermostat mode switch to COOL
2. Move the Thermostat Fan switch to AUTO.
3. Set the temperature to a temperature below current room temperature

The Air conditioner's evaporator fan will begin to operate as soon as the thermostat's set point is below the current room temperature, by at least 2 degrees.

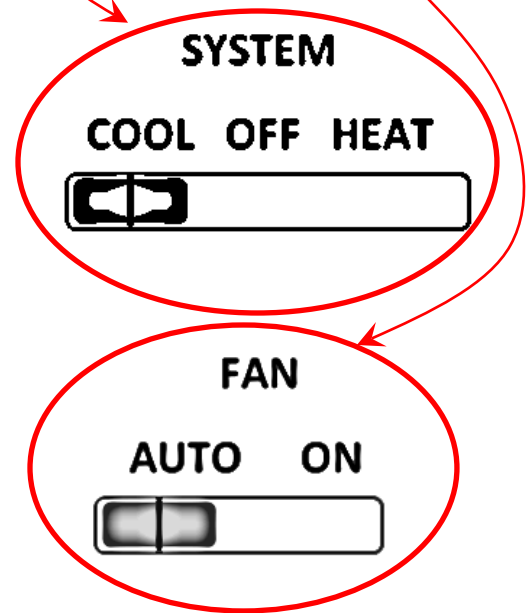
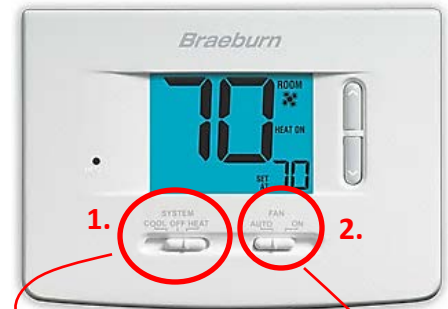
The air conditioner's compressor will begin operation 8 seconds after the evaporator fan has begun operation.

Turn ON & OFF the Idle Free Air Conditioner using the Thermostat only. The Idle Free Air conditioner will be automatically disabled when the truck's key is switched to the ON position.

If the system operator turns the truck's ignition Key to the ON position with the air conditioner operating, the Idle Free air conditioner will shut down and will not begin to operate again (compressor) for 5 minutes.

The 5 minute shut down period prevents damage to any of the Idle Free components.

The 5 minute automatic protection is also a part of the Idle Free Thermostat circuit. Whenever the Idle Free system is turned off using the thermostat, a 5 minute delay will prevent the air conditioner from starting back up for a 5 minute time period.



Bunk Heat Mode

1. Move Thermostat mode switch to HEAT.
2. Move Thermostat Fan switch to AUTO.
3. Do not set the temperature

The thermostat is used to turn on the Idle Free water heater.

The thermostat, when in HEAT Mode, provides 12VDC power to the Truck's Bunk Blower fan relay.

The Thermostat's temperature settings are not used in Heat Mode.

The truck's bunk controls are used to provide Bunk Heat & temperature control.



#62001

System operation

Engine Heat Mode

1. Move the Thermostat mode switch to HEAT.
2. Turn the bunk blower fans to OFF

The coolant heater only will begin operation.

The coolant heater is located on the outside of the truck, either alongside the air conditioner (in the APU) or under the bunk.

If the bunk fans are turned OFF, the heat from the Idle Free coolant heater will circulate through the engine block.

Truck Engine Running Mode

When the truck engine is running the following is taking place regarding the Idle Free unit.

1. The Water Heater & the Air Conditioner have been automatically shut down.
2. The Idle Free inverter is still operational and is probably in stand-by mode.
3. The truck's alternator is charging the truck's battery bank and is charging the AGM battery bank once the truck battery voltage has risen to 13.2 VDC.
4. The Idle Free Battery Separator has connected the battery banks together, truck starter batteries & the Idle Free AGM batteries.
5. The engine's coolant is running through the Idle Free coolant heater.
6. The Idle Free Voltmeter and the truck's voltmeter are displaying the same voltage

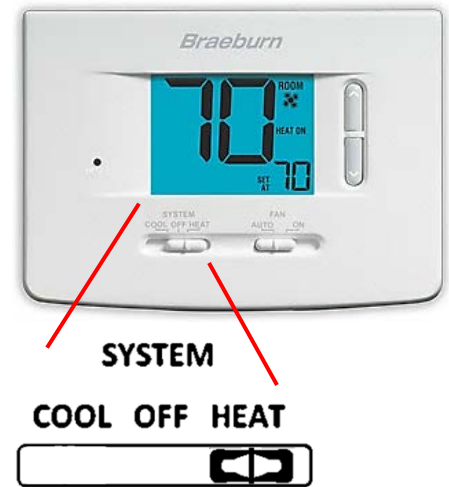
Shore Power mode

Shore Power is the act of plugging an extension cord into a 120VAC outlet.

The truck should be plugged into shore Power at every opportunity so as to be able to automatically charge the Idle Free AGM batteries and the truck's starter battery bank.

When the truck is plugged into Shore Power the following will automatically take place.

1. Batteries are charged (truck & AGM).
2. Run time is unlimited
3. Truck's 12VDC circuits operate from Shore Power.



Battery Separator



Voltmeter



#62001

System operation

Shore Power mode, continued

The Idle Free Power Converter converts incoming 120VAC power (Shore Power) to 12VDC power.

When Shore Power is available, the converter maintains the Idle Free AGM battery voltage.

The Power Converter has a rated amperage output of 55 AMPS DC. The Idle Free air conditioner uses less than 50 AMPS DC and when using the Power Converter (Shore Power), the AGM battery voltage level maintains 12.6 VDC or higher.

Whenever the Power Converter's DC voltage rises past 13.2VDC, the Idle Free Battery separator closes and connects the Idle Free battery bank to the truck's battery bank (Battery Separator RF101). If the combined voltage of both battery banks remains above 12.8VDC, both battery banks will remain connected and both Battery banks will receive a charge from the Idle Free Power Converter.

Inverter Stand-by mode

The Idle Free inverter is used with-in the system to operate the Idle Free air conditioner. The inverter includes a Master ON/OFF switch however the inverters Master switch is left in the ON position.

The inverter ON/OFF automatic operation is controlled by factory set Dip Switches. The Dip switches are set so that the inverter will move into a stand-by condition whenever the need for electricity has gone away for 6 seconds. After the 6 second period the Inverter is in a mode where it is looking for an electric load of >20 watts.

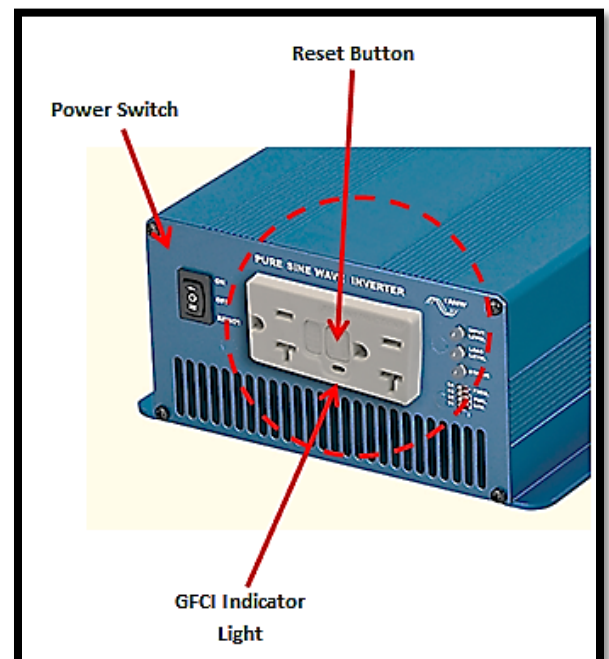
When a load of 20 watts is needed, the inverter will automatically wake-up.

The inverter will automatically wake up when the Idle Free air conditioner is turned on.

The Idle Free inverter will display a flashing green light when the inverter is in stand-by mode.

The Inverter's outlet will display a flashing green light when the outlet is operating properly.

The **Component Detail** section of this manual will offer greater detail regarding the inverter.



#62001

System operation

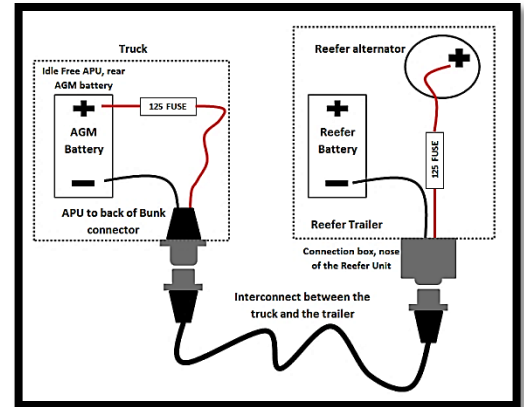
ReeferLink mode

The Idle Free Reefer Link system is a controlled DC connection between the truck and the reefer unit.

The ReeferLink connection provides battery charging for the Idle Free APU.

The controlled DC connection between the truck and the trailer allows the truck, or the reefer unit, to supply power to one another.

In the event that a truck alternator or a reefer alternator fail, the ReeferLink connection is used to literally connect the 12VDC connections (truck and reefer trailer) together.



Description & Application

The Reefer Unit must have an alternator rating of 65 AMPS or greater.

The ReeferLink Connection provides the 12VDC power, available when the Reefer unit is running, to be used to maintain the Idle Free APU battery bank voltage.

Reefer units will automatically start their engines when the starter battery requires charging. A starter battery voltage of <12.1VDC will engage the start circuit of the reefer unit. If the Idle Free ReeferLink connection is in place, the reefer unit will engage its start circuit. The reefer unit will continue to operate until the alternator output amperage drops to <8 AMPS.

When the reefer unit is running, with the Idle Free ReeferLink connection in place, the following will take place:

Reefer Battery and Idle Free Battery bank will see alternator output voltage and amperage.

Reefer Alternator will close the Idle Free battery separator when the Idle Free battery bank rises to 13.2VDC.



62001

Component Detail

Thermostat

Description and Application

The Idle Free Thermostat contains an LCD display and two Slide Switches.

The IFS Thermostat uses two AA Batteries to power the display and to send switch signals to the Idle Free Relay Group.

The Thermostat's left slide switch is used to turn ON/OFF the air conditioner or to turn ON/OFF the heater.

The right slide switch (FAN) has two positions marked AUTO & ON.

The Fan Switch, AUTO position, is used if the operator wishes to have the air conditioner's evaporator fan turn ON and OFF with the air conditioning compressor. Leaving this Fan switch in the ON position will continuously run the evaporator fan regardless of the compressor's current mode.

The driver should place the Fan Switch in the ON position for best system performance.

The IFS Thermostat has two soft push buttons located next to the LCD Display.

The top soft switch increases the temperature setting of the thermostat and the bottom soft button decreases the temperature of the room setting.

A low Voltage Battery Indicator Icon is shown, on the display, when the AA batteries (2) need to be changed.

Heat mode

The thermostat is used to turn on the Idle Free water heater and the Heat relay.

The thermostat when in HEAT Mode provides 12VDC power to the Truck's Bunk Blower fan.

The Thermostat's temperature settings are not used in Heat Mode, The truck's bunk controls are used to provide Bunk Heat temperature control.

Technical Information

The Idle Free Thermostat can be separated from its mounting base.

The Thermostat is supplied with 12VDC Power from the 2AMP fuse located on the front of the UBB (Under Bed Box).

12 VDC power enters the thermostat on the red wire, R terminal (Jumped) to a second R marked terminal.

The thermostat's switch positions determine where, how and when 12VDC power is sent to the UBB's Relay Group.

- G Terminal - Green wire; 12VDC to the Evaporator Relay
- Y Terminal - Yellow Wire; 12 VDC to the Compressor Relay
- B terminal – Blue Wire; 12VDC to the Heat Relay

The back side of the Thermostat includes 3 DIP switches that need to be in the proper position for the Thermostat to Function Properly

1. CONV/HP = HP
2. F/C = F
3. HE/HG = HG

62001

Component Detail

Voltmeter

Description & Application

The DC Voltmeter is used as an Idle Free AGM battery Fuel Gauge.

The DC Volt Meter is connected to the Under Bed Module.

The flat magnet is located on the back side of the DC Voltmeter.

The DC Voltmeter has a 6 foot cord used to enable the use of the Voltmeter in the driver's living area.

Overview

The Voltmeter is divided into 2 halves, top and bottom.

The bottom half represents the battery voltage when the truck's engine is not running.

The top half of the voltmeter displays the voltage when the truck's engine is running or when the truck is plugged into Shore Power.

If the truck's engine is running, a least one of the top 3 lights should be lit.

The longer the truck engine runs, the more lights will be lit.

The voltage reading of this volt meter should be the same as the trucks battery voltage when the truck's engine is running.



Evaporator

Description & Application

The Evaporator Module contains an evaporator coil, an electric blower fan, and an expansion valve.

The Evaporator's blower fan is a single speed, 120VAC fan.

The Evaporator Module has 2 refrigerant hoses, a drain hose and a power cord exiting out the bottom of the module.

The Evaporator Module includes an aluminum filter (rear location).

The Idle Free Evaporator has a removable aluminum filter that must be cleaned (water) in order to maximize performance.



History of Issues

The Evaporator must be maintained in a way that allows air to reach the rear side, filter.

Keep driver's personal belongings away from the Evaporators air intake (coil & filter, back side).

Suggestion; have user place the right Thermostat switch into the ON position, not the AUTO position. Leaving the Thermostat in the ON position when in Air Conditioning Mode will keep the room in a consistent temperature range.

62001

Component Detail

Battery Separator

Component Location

APU, Exterior

Top Level, Front



Description & Application

The Battery Separator is used to separate the Truck's battery bank from the Idle Free, AGM battery bank.

The Battery Separator is rated at 200 DC Amps and is controlled by its attached circuit board.

The battery separator connects the truck battery bank to the APU battery bank when it determines that the truck's battery bank has reached and exceeded 13.2 VDC.

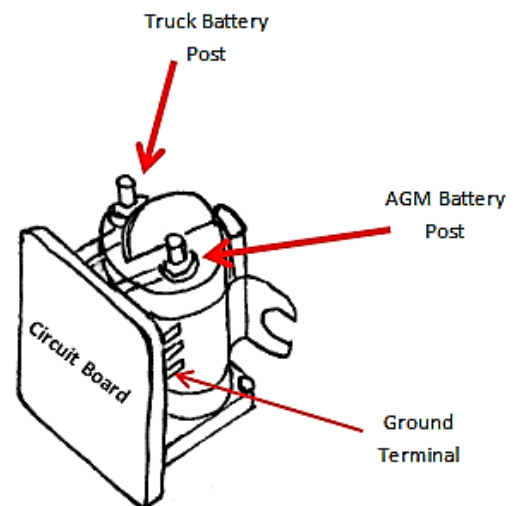
When the battery separator closes, the truck's alternator charges the combined battery banks, the truck starter batteries and the Idle Free Batteries.

If the alternator fails to keep the combined battery voltage above 12.8 VDC, the battery separator will open (separate the battery banks).

The Battery Separator will combine both battery banks together when either battery bank reaches and exceeds 13.2 VDC.

The Idle Free AC to DC Power Converter is connected to the AGM battery side of the battery separator via the UBB, (under bed box). This means whenever the Idle Free AC to DC Power Converter is plugged into Shore Power, the ac to dc power converter supplies DC Power to the AGM batteries. When the DC power from the AC to DC Power converter raises and exceeds 13.2 VDC (on the Idle Free battery bank), the battery separator will close & send the DC power to the trucks battery bank via the battery separator.

If the combined battery bank voltage drops below 12.8VDC, the battery separator will open the connection between the 2 battery banks.



#62001

Component Detail

APU

APU, exterior

Description & Application

The APU is mounted on the Truck's Frame and includes:

1. AGM Batteries (4)
2. Battery separator
3. AGM Battery Fuse
4. Water Heater Module (option)
5. Air Conditioner Module (condensing unit)
6. Frame (APU frame)
7. Cover with Condenser Fan
8. Air conditioning & Heater Harness
9. Red, Green, & Black DC, panel mount connectors

HVAC Unit
(No Batteries)



APU
(Batteries - lower level)



62001

Component Detail

Shore Power

Description and Application

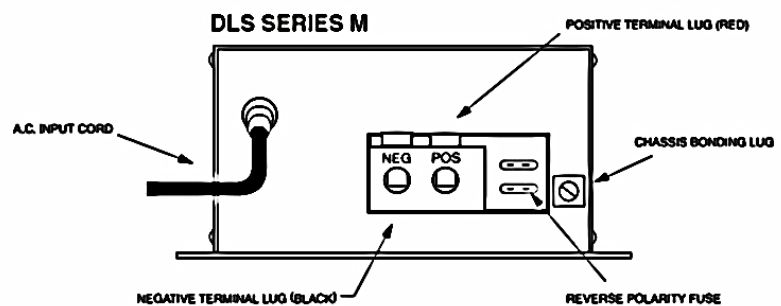
The Idle Free Power Converter converts incoming 120VAC power (Shore Power) to 12VDC power.

When Shore Power is available, the Idle Free, AC to DC 55 AMP Power converter maintains the Idle Free AGM battery voltage.

Whenever the Power Converter's DC voltage rises past 13.2VDC, the Idle Free Battery Separator closes and connects the Idle Free battery bank to the truck's battery bank. If the combined voltage of both battery banks remains above 12.8VDC, both battery banks will remain connected and both Battery banks will receive a charge from the Idle Free Power Converter.

Potential Issues

1. Installer connects a ground power supply cable to the wrong (+ or -) battery post. This action causes the Power converter's DC fuses to fail. The (2, 30 AMP) fuses are located on the rear side of the Power Converter.
2. Shore Power (plugging in) is perceived to be a direct use of 120VAC power that directly powers the 120VAC Idle Free air conditioning circuit. Shore Power is only used to convert AC to DC. The inverter is always the 120VAC power provider for the Idle Free air conditioner.



62001

Component Detail

Ignition Cut-out Circuit

The Idle Free system includes an ignition cut-out circuit that is used to automatically shut the Idle Free system OFF, when the truck's engine is running or when the ignition key is in the ON position. The Idle Free system needs to be shut down using the Idle Free thermostat however the Idle Free ignition cut-out circuit is in place to prevent system damage in the event that the user fails to turn the Idle Free system OFF, using the Thermostat switch.

- The Idle Free Ignition cut-out circuit cuts 12 volt power to the thermostat whenever the truck's engine is operating or whenever the truck's ignition key is switched to the ON position.
- The Idle Free inverter is not shut down with the ignition cut-out circuit.
- The Idle Free Heater and the Idle Free air conditioner are shut down when the Idle Free ignition cut-out circuit is activated.
- Turning the ignition key to the ON position will activate a 5 minute delay in the Idle Free air conditioning circuit.

An automatic relay is a part of the Idle Free air conditioning circuit that will disable the IFS air conditioner for 5 minutes if the truck's ignition key is placed into the ON position.

Issues

1. The Ignition Cut-out circuit has been installed incorrectly on rare occasions. When the installation instructions are not followed or the ignition cut-out circuit is connected to the accessory circuit instead of an **ignition only** circuit. This causes the Idle Free air conditioner or heater to shut off whenever the truck's ignition key is moved to the accessory position. When the user wants to listen to the radio, the Idle Free system shuts down.
2. The Idle Free system user turns the ignition key to the ON position without turning the air conditioner to the OFF position (thermostat). When the user turns the ignition key back to OFF, the Idle Free air conditioner is forced to start without a 5 minute delay (Delay is built into the Thermostat). The Idle Free air conditioner start attempt (forced) under these conditions may overload the inverter.

***Do not use the truck's ignition to turn off the air conditioner.
Always use the Thermostat Mode Switch to control Air conditioning and
Heat functions.***

62001

Component Detail

5 Minute Delay Circuits

The Idle Free system contains one means of system protection in the form of two, 5 minute delay circuits. These circuits are in place to protect the inverter, compressor and the IFS start capacitor.

In an effort to eliminate problems associated with starting air conditioners under load, delay circuits are put in place to allow the pressure to drop over a time period, in our case, 5 minutes.

1. Thermostat

The thermostat's 5 minute delay circuit is automatically activated when the set point temperature has been met or when the user moves the mode switch from COOL to OFF.

2. Delay Timer Relay

The Delay timer relay is automatically activated when the truck's ignition key is turned ON. This includes times when the key is moved to the ON position to open a window or to check the mileage on the truck's odometer.

The system operator needs to remember to turn the Idle Free system OFF using the Thermostat.

Any time the Idle Free system is turned off with the truck's key the Delay timer relay will not allow the system to operate for 5 minutes.

62001

Component Detail

Water Heater

Description & Application

The Idle Free Water Heater is located in the APU (Exterior).

The Water Heater consists of:

1. Webasto TSL17 Coolant Heater
2. Dosing Pump (Fuel Pump)
3. Fuel Filter & Fuel Circuit
4. Coolant Circuit

The **Webasto TSL17** is a 17,000 BTU coolant heater that is connected to the engine's coolant circuit. When the truck's engine is running, the engine's coolant is circulated through the engine block, cab heater core, Idle Free Coolant Heater, and bunk heater core.

When the truck's engine is shut off and the Idle Free Heater Module is turned ON, the engine's coolant continues to flow through the Engine Block, and both Heater cores (Cab & Bunk), by means of the 12VDC circulating pump, attached to the Webasto TSL17 Coolant Heater.

The Water heater monitors the coolant's temperature, as the coolant flows through the truck's coolant circuit.

Once the truck's coolant temperature drops to 138 degree (F), the Water Heater begins its "start-up cycle". The truck's engine thermostat will close when then engine's coolant temperature drops below 180 degrees. When the engine block thermostat is closed, the size of the coolant system is decreased.

When the Idle Free Heater Module is activated, the truck's bunk blower fan is powered by the Idle Free battery bank.

The Water Heater Module's coolant pump is running 100% of the time that the Thermostat Mode switch is in the HEAT position.

Dosing Pump

The Idle Free dosing pump (fuel pump) is mounted on the rear wall of the APU.

The electrical connection is made using 2 wires. The dosing pump has 2 speeds. The speed of the dosing pump determines the output of the heater. The temperature requirements for the coolant heater determine the speed of the dosing pump/ heater output.



62001

Component Detail
Water Heater



Fuel Filter

Fuel Filter & Fuel Circuit

The in-line fuel filter is attached to the input side of the Idle Free dosing pump.

The fuel line feeding the fuel filter begins at the fuel pick-up tube on one of the trucks fuel tanks.

Coolant Circuit

The Idle Free Heater Module is plumbed in series with the trucks bunk heater core coolant circuit. The truck is plumbed so that the water heater's coolant inlet circuit begins at the rear of the truck's engine. The engine's coolant runs through the Idle Free water heater, the bunk's heater core, and returns to the engine block.



Common Issues

The Water Heater Module is trouble Free however issues exist that prevent the heater from starting after a period of non-use.

The fuel filter needs to be checked to make sure that fuel is present. If the tank fuel pick-up tube is not properly located in the fuel tank or if the truck was run out of fuel, the fuel filter may be void of fuel. The fuel filter will need to be primed if the fuel filter does not have fuel present.

The Water Heater Module will shut down if the Water Heater over-heats. Overheating will take place if the coolant circuit has its coolant supply cut off (closed valves).

If the Water heater shuts down 5 times, the heater will not attempt to re-start unless the 12VDC power plug is removed and re-installed into the socket (Heater reset procedure).

Top of Water Heater
(Oval connector is Power connector, left)



62001

Component Detail Inverter

Description

The Idle Free Inverter provides 120VAC sine wave power for the Air Conditioner's Compressor and Evaporator Blower Fan.

The Inverter is rated at 1500 watts continuous with a 3000 watt Surge Capacity.

The Inverter has a GFCI outlet that is used to protect against electrical shock hazards.

The Inverter is located in the UBB Module, lower level.

The Inverter is installed with Stand-By mode activated. Stand-by mode is used as an automatic ON/OFF feature (shuts off automatically, ON with load > 20 watts).

A 120VAC Power Strip is included with the Idle Free system. The power strip can be used to power driver needs. Some small wattage 120VAC convenience devices can be powered with the inverter (if managed properly).



Application

120VAC Inverter Power is sent from the Inverter through two relays to activate the 120VAC Compressor circuit and the 120VAC Evaporator circuit. Both Relays are controlled with a 12VDC signal from the Idle Free Thermostat.

The Compressor Relay sends it 120VAC to the exterior located APU.

The Exterior APU Module's Compressor 120VAC Circuit contains a pressure switch, condenser fan relay, run capacitor, start capacitor, and a compressor.

The Evaporator Relay sends its power to the Evaporator module to power the single speed 120VAC Blower fan typically located in a bunk closet.

Component History, Issues

1. GFCI will trip occasionally when Idle Free system is turned off suddenly by starting the truck. The user manual instructs the driver to turn OFF the air conditioner with the Thermostat Only.
2. The Inverter may over load (Red Light condition) if the Start Capacitor is not properly connected to the run capacitor. The connection quality is a factor especially after a year of operation. Service is required for the electrical APU Harness, Clean, Tight, & Corrosion application for all APU electrical connections.
3. Inverter may shut down if 1500 watts is exceeded or 3000 watts surge is exceeded. The Inverters maximum output is exceeded when the air conditioner is turned off for a few seconds and then back ON by turning the Ignition key ON and then OFF.
This action forces the air conditioner to attempt to start however the pressure present on the high side Freon circuit may be too high for the inverter (output) to overcome. The correct USER procedure is to turn the air conditioner off using the slide switch on the face of the thermostat.
4. The inverter may overload if a microwave is used that exceeds the maximum output rating of the inverter. This tends to be the case on any microwave rated at >700watts. The microwave rating is based on run watts not the watts needed to start the microwave. Idle Free cannot control what is plugged into the inverter and the user needs to understand the inverter parameters.

62001

Component Detail

Inverter

Component History, Issues, continued

5. Drivers need to understand the “Do’s and Don’ts” when using the Idle Free air conditioner. The inverter will display LED lights that will show the reason for the inverter shut down. Learning to properly react to these indicators will eliminate most inverter issues.
6. A permanent label/sticker is affixed to the underside of the UBB Cover. This information label contains helpful information for troubleshooting the inverter.

Inverter Diagnostics

The Idle Free Inverter has all the indicators in place to determine why it is or is not working.

- The Top indicator light is the Input DC voltage
- The Center Indicator light is only lit when an inverter load is present, Green = Okay, Red = too High
- The Bottom indicator light is green or flashing green when the inverter is ON or in stand-by mode
- The GFCI has its own indicator light that replicates the bottom light (Status) Green or Flashing Green.

If the bottom light is RED the GFCI indicator light will not be lit because the inverter is shut down when the status light is RED.

The inverter is fused internally with non-replaceable fuses. The inverter fuse power from the AGM battery bank is located in the APU, exterior frame mounted unit, above the battery separator.



Troubleshooting

62001

Troubleshooting

Inverter

A permanent label/sticker is affixed to the UBB Cover (under Bed Box). This information label contains helpful information for troubleshooting the inverter.

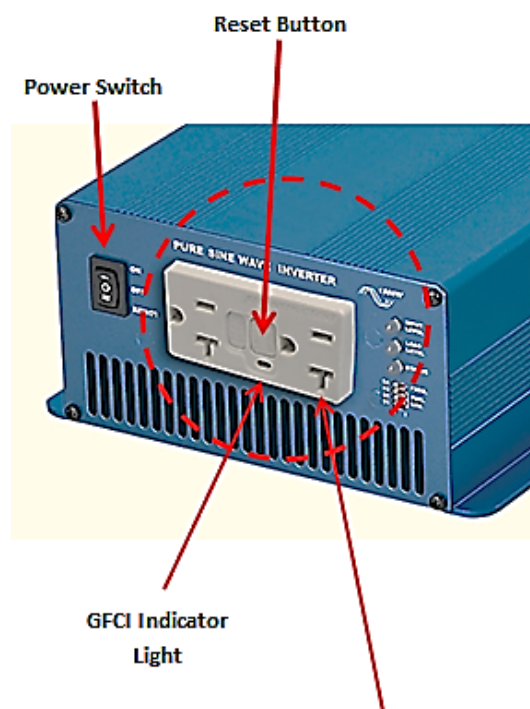
1. The Top light on the face of the inverter needs to be Green or Yellow. If the top Light is Red, the Batteries need to be charged with Shore Power or the truck's engine.
2. The Bottom light on the face of the inverter is called the Status Light. The status light uses colors and flashing to communicate the current status of the inverter. If the inverter is currently working, the status light will be solid Green or Flashing Green. If the Inverter is not working, the bottom status light will be flashing Red or solid Red.
3. A flashing Red light indicates that the inverter shut down from running out of battery power, low voltage.
4. A solid Red status light indicates that the inverter shut down from exceeding its 1500 watt maximum output. The maximum inverter output may be exceeded if the start capacitor has failed or if a microwave has been used that exceeds the inverter's capacity during start up.

GFCI Reset Procedures

1. Locate the GFCI Outlet, found on the end of the inverter.
2. Turn the inverter OFF using the black switch, located to the left of the white 120VAC outlet.
3. Turn the Inverter ON using the black switch, located to the left of the white 120VAC outlet.
4. Push the Reset Button in within 5 seconds of turning the inverter switch to the ON position.

OR

5. Locate the GFCI Outlet found on the end of the Inverter.
6. **Push and Hold** the **Reset** Button "IN".
7. Turn the Inverter Switch to the **OFF** position.
8. Turn the Inverter Switch to the **ON** position.
9. Holds reset button IN until you feel it Click.



Note; on some Inverter models the GFCI indicator light is located in this location.

62001

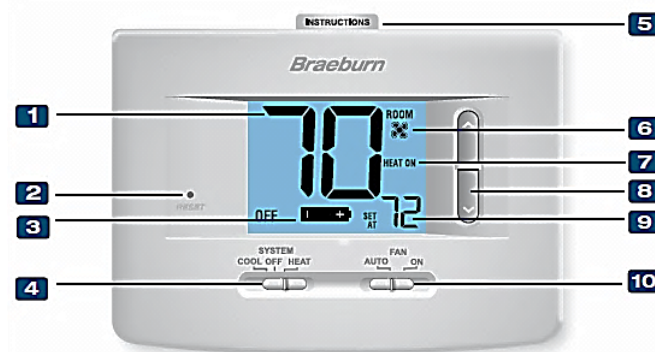
Troubleshooting

Thermostat

The Thermostat should show the current temperature of the bunk, in its LCD display, at all times.

The lower right corner of the thermostat displays the Air conditioners Set Point temperature.

If the display is blank, separate it from its base and replace the 2 AA batteries located on the inside of the thermostat.



- 1** Room Temperature.....Displays the current room temperature
- 2** Reset Button.....Resets thermostat back to factory defaults
- 3** Low Battery IndicatorIndicates when the batteries need to be replaced
- 4** System Switch.....Selects system preference
- 5** Quick Reference
InstructionsStored in slot at top of thermostat
- 6** Fan IndicatorIndicates when the system fan is running
- 7** System Status Indicator...Displays information about the status of the system
- 8** Arrow ButtonsUsed to increase or decrease settings
- 9** Set TemperatureDisplays the current set point temperature
- 10** Fan Switch.....Selects the system fan mode
- Battery Compartment.....Located in the back of the thermostat

Switch	Factory Default
CONV / HP	CONV
F / C	F
HE / HG	HG

Thermostat
DIP Switch
Settings

Wiring Terminations

Terminal	
Rc	Red Wire, 12VDC IN from Thermostat harness
Rh	
O	Not Used
B	Blue wire, Heater ON
Y1	Yellow wire, Compressor ON
G	Green wire, Evaporator ON
W1	Not Used
C	Not Used

62001

Troubleshooting

Voltmeter

Shore Power

The Idle Free Power Converter converts incoming 120VAC power (Shore Power) to 12VDC power.

When Shore Power is available, the converter maintains the Idle Free AGM battery voltage.

The Power Converter has a rated amperage output of 55 AMPS DC. The Idle Free air conditioner uses less than 50 AMPS DC and when using the Power Converter (Shore Power), the AGM battery voltage level maintains 12.6 VDC or higher. Whenever the Power Converter's DC voltage rises past 13.2VDC, the Idle Free Battery separator closes and connects the Idle Free battery bank to the truck's battery bank (Battery Separator RF101). If the combined voltage of both battery banks remains above 12.8VDC, both battery banks will remain connected and both Battery banks will receive a charge from the Idle Free Power Converter.

The Power Converter's 120VAC circuit begins on the truck's exterior with a covered receptacle (male) that is used to receive the female end of an extension cord.

The Power Converter's DC circuit begins at the bulkhead DC Connection posts on the lower back corner of the UBB



Shore Power can be checked to verify proper operation by checking the voltage level of the AGM battery bank.

The Idle Free Voltmeter will have more than 3 lights are lit if shore power is working.

1. Before shore power is plugged in, check the voltage level of the Idle Free (AGM) battery bank.
2. Count the number of lights lit on the Idle Free Voltmeter.
3. Plug into Shore Power
4. Check the number of lights lit on the voltmeter. The number of lights lit will be greater than the number lit prior to plugging into shore power.

62001

Troubleshooting

Description & Application

The Idle Free Water Heater is located in the APU (Exterior).

The Water Heater consists of:

- Webasto TSL17 Coolant Heater
- Dosing Pump (Fuel Pump)
- Fuel Filter & Fuel Circuit
- Coolant Circuit

The **Webasto TSL17** is a 17,000 BTU coolant heater that is connected to the engine's coolant circuit.

When the truck's engine is running, the engine's coolant is circulated through the engine block, cab heater core, Idle Free Coolant Heater, and bunk heater core.

When the truck's engine is shut off and the Idle Free Heater Module is turned ON, the engine's coolant continues to flow through the Engine Block, and both Heater cores (Cab & Bunk), by means of the 12VDC circulating pump, attached to the Webasto TSL17 Coolant Heater.

The Water heater monitors the coolant's temperature, as the coolant flows through the truck's coolant circuit.

Once the truck's coolant temperature drops to 138 degree (F), the Water Heater begins its "start-up cycle".

The Water Heater Module's coolant pump is running 100% of the time that the Thermostat Mode switch is in the HEAT position.

Dosing Pump

The Idle Free dosing pump (fuel pump) is mounted on the rear wall of the APU.

The electrical connection is made using 2 wires. The dosing pump has 2 speeds. The speed of the dosing pump determines the output of the heater. The temperature requirements for the coolant heater determine the speed of the dosing pump/ heater output.

Common Issues

The Water Heater Module is trouble Free however issues exist that prevent the heater from starting after a period of non-use.

The fuel filter needs to be checked to make sure that fuel is present. If the tank fuel pick-up tube is not properly located in the fuel tank or if the truck was run out of fuel, the fuel filter may be void of fuel. The fuel filter will need to be primed if the fuel filter does not have fuel present.

The Water Heater Module will shut down if the Water Heater over-heats. Overheating will take place if the coolant circuit has its coolant supply cut off (closed valves).

If the Water heater shuts down 5 times, the heater will not attempt to re-start unless the 12VDC power plug is removed and re-installed into the socket (Heater reset procedure).

62001

Troubleshooting

Bunk Heat

The Idle Free heater heats the bunk using the bunks heater core and blower fan.

The Idle Free Heater does not control the bunks temperature with the Idle Free Thermostat.

The Idle Free Heater uses the truck's factory heat controls to heat the bunk.

To test the water heater and bunk fans:

1. Turn the trucks key to the ON position
2. Turn on the bunks blower fans, confirm operation in all speeds
3. Turn the trucks key to the OFF position
4. Turn the switch that controls the bunks blower fans, confirm that the fans **do not** operate.
5. Turn on the Idle Free Heater by moving the Mode switch to HEAT.
6. Turn on the bunks blower fans, confirm operation in all speeds

If the bunk blower fans do not operate with the Idle Free Thermostat in the Heat position:

1. Check the fuses located on the right front corner of the UBB
2. The lower 3 fuses control the bunks blower fan when the Idle Free Heater is turned ON.
3. Check the 6 wire connector at the back of the UBB; make sure that it is plugged into the socket.
4. Confirm that the key is in the OFF position.

